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Row Width Effects on Corn Yield at Varying Plant Densities

Abstract

The majority of corn acres in Iowa are planted in “conventional” 30-inch row widths, with some farmers choosing to stay with the 38-inch row system. Questions often arise on the magnitude of yield penalty, whether there really is a yield penalty, or if there is actually a benefit to wider row corn in specific situations with today’s elite hybrids. Recommendations are difficult because current data do not exist. There also is growing interest in narrower row corn (20-inch) and any economical or environmental benefits associated with this practice. These two questions have created a need for more research involving modern hybrids and management practices. The objectives of this study were to (1) identify any row width benefits and (2) determine the optimum planting population for each row width. In addition to this site in 2000, this research was conducted at two other university research farms.

Disciplines

Agricultural Science | Agriculture

Row Width Effects on Corn Yield at Varying Plant Densities

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Introduction

The majority of corn acres in Iowa are planted in “conventional” 30-inch row widths, with some farmers choosing to stay with the 38-inch row system. Questions often arise on the magnitude of yield penalty, whether there really is a yield penalty, or if there is actually a benefit to wider row corn in specific situations with today’s elite hybrids. Recommendations are difficult because current data do not exist. There also is growing interest in narrower row corn (20-inch) and any economical or environmental benefits associated with this practice. These two questions have created a need for more research involving modern hybrids and management practices. The objectives of this study were to (1) identify any row width benefits and (2) determine the optimum planting population for each row width. In addition to this site in 2000, this research was conducted at two other university research farms.

Materials and Methods

The experiment was laid out in a randomized complete block design with four replicates. Three final plant densities (24,000, 28,000, and 32,000 plants per acre (ppa)) were tested at each of the row spacings (20-, 30-, and 38-inch). A single 102- to 106-day relative maturity European corn borer-resistant hybrid from Novartis (N4640Bt) was used in all treatments. Plots were four rows wide by 40 feet long and were planted with an International 185 series planter. Proper row widths were accomplished by sliding the individual row units along the

toolbar and each row unit was independently ground-driven. The study was planted on 5 May 2000 and was harvested on 3 October 2000. Reported plot yields and harvest moistures (corrected to 15.5% moisture) are shown in Tables 1 and 2.

Results and Discussion

Overall, there were significant effects of row width and plant density, but there was not an interaction between row width and plant density ($P \leq 0.05$). There were significant effects of row width when examined at each individual plant density, and population was significant in the 20- and 38-inch row widths ($P \leq 0.05$) and in 30-inch rows ($P \leq 0.10$).

As summarized in Table 1, yield from 20- and 30-inch row spacings were significantly increased over the 38-inch treatment overall and within the 24,000 and 28,000 ppa treatments ($P \leq 0.05$). At 32,000 ppa, only 20- and 38-inch row spacings were significantly different ($P \leq 0.05$). Looking at individual row widths, the highest population generally yielded the most in all treatments. There were significant differences between 24,000 ppa and the two higher populations in 38-inch rows, whereas no significant density effects were evident in 30-inch rows ($P \leq 0.05$). In 20-inch row spacings, only 24,000 ppa and 32,000 ppa were significantly different ($P \leq 0.05$).

There were no significant differences caused by row width, plant density, or their interaction on harvest moisture as shown in Table 2 ($P \leq 0.05$).

Acknowledgments

We would like to thank John Harker and Novartis for providing the seed used in this study.

Table 1. Row width and plant density effects on corn yield (bushels/acre) in 2000 at Chariton, IA.

Row Width	Plant Density (ppa)				LSD _(p ≤ 0.05)
	24,000	28,000	32,000	Average	
20-inch	165.	173.	179.	172.	12.
	5	7	0	7	4
30-inch	164.	173.	173.	170.	9.0
	9	2	1	4	
38-inch	150.	158.	164.	157.	6.3
	6	5	2	8	
Average	160.	168.	172.	167.	4.7
	3	5	1	0	
LSD _(p ≤ 0.05)	7.1	10.1	13.0	4.7	

Table 2. Row width and plant density effects on harvest moisture (%) in 2000 at Chariton, IA.

Row Width	Plant Density (ppa)				LSD _(p ≤ 0.05)
	24,000	28,000	32,000	Average	
20-inch	10.	10.	9.9	10.	N
	2	1		1	S
30-inch	10.	9.9	10.	10.	N
	1		4	1	S
38-inch	10.	10.	10.	10.	N
	4	3	1	3	S
Average	10.	10.	10.	10.	N
	2	1	1	1	S
LSD _(p ≤ 0.05)	NS	NS	NS	NS	